





**Program Management Community Support Department (AIR 1.1)
Environmental Support Office (AIR 1.1E)**



The Material Substitution Database



*Finding Environmentally Friendly
Substitutes for Hazardous Materials*

A database is now available to support the search for intelligent, appropriate and environmentally friendly substitutes for hazardous materials.

Material substitution is one of the principal means of pollution prevention (P2) related source reduction established by the Pollution Prevention Act of 1990. However, while the concept of substituting an environmentally friendly material for one that generates pollution, hazardous waste, or other contaminants is simple, the practice of source reduction can be complicated. Complications arise from the need to demonstrate and validate the technical feasibility of substitute products. This process can be costly and time-consuming, but is vital to ensure that new materials are safe and effective for their intended use.

The Naval Air Systems Command's (NAVAIR) Program Management Community Support Department (PMCSO) Environmental Support Office (AIR 1.1E) developed the Material Substitution (MatSub) database to support the search for intelligent, appropriate and environmentally friendly substitutes for hazardous materials. The MatSub database is populated with data from General Series (GS) manuals, and includes material nomenclature, the relevant specification(s), current uses, possible replacements and links other relevant data sources. These links include the Shipboard Hazardous Materials List (SHML) and Acquisition Streamlining and Standardization Information System (ASSIST).

The Material Substitution Database



The MatSub database can help identify environmentally benign materials for use in routine maintenance performed by sailors while on deployment.
U.S. Navy photo by Photographer's Mate Airman Ryan O'Connor.

What is the Material Substitution Database?

The MatSub database catalogues and identifies any material substitutes/replacements that are typically more environmentally benign than the current material approved for a given process. The information for the database comes from the most current substitutes/replacements made in maintenance manuals, along with the developed and approved substitutes/replacements at NAVAIR's research laboratories and Depots. Further development of the MatSub database will incorporate promising new materials and/or processes that are in the demonstration/validation stage of their development (e.g., not necessarily approved, or yet to be incorporated in technical manual changes). This will allow new acquisition programs to "look ahead" at some possible improvements.



Using fluorescent penetrant fluids (a hazardous material) is a traditional method of non-destructive inspection (NDI) for detecting cracks in the metal parts. The MatSub database can identify if a new material and/or process is being developed that is more environmentally friendly.
U.S. Navy photo by Photographer's Mate 2nd Class John Collins.

Substitutes Found In the Materials Substitution Database

Substitutes can be found for the following materials in the MatSub database:

- Solvents
- Paints and primers
(substitutes that are non-chromated)
- Paint thinners
- Paint removers
(substitutes that are non-Hazardous Air Pollutants (HAP))
- Adhesives
- Sealants
- Aqueous cleaners
(substitutes for solvent cleaning)

How Does It Work?

Users simply enter a material's part number or relevant specification and the MatSub database displays viable substitutes. The user is also

informed if no approved substitutes exist. The following table illustrates the capabilities of the MatSub database.

Examples of Search Results on "Sealants" From the Material Substitution Database

Specification No.	Specification or Part Number (to be substituted)	Nomenclature	Status of Specification	Hazardous Ingredient(s)	Current Use	Suitable Substitutes
1.	MIL-A-46106	General Purpose Silicon Room Temperature Vulcanized (RTV) Adhesive Sealant	Active	May contain Environmental Protection Agency (EPA) Top 17 materials	Non-corrosive adhesive/sealant silicone, RTV	No suitable substitute exists at this time.
2.	MIL-S-8516 superceded by MIL-PRF-8516	Sealant	Active	Contains lead	Synthetic rubber sealant for use on electrical systems	No suitable substitute exists at this time.
3.	MIL-S-81733/ MIL-PRF-81733	Compound, sealing	Active	- Toluene , ((HAP Volatile Organic (VOC), Compound EPA-17 chemical - Chromium (HAP, EPA-17 chemical)	Corrosion inhibiting sealant	- Does or may contain an Ozone Depleting Substance (ODS) or EPA-17 chemical. - No alternative at this time
4.	ASTM-D740	Methyl Ethyl Ketone (MEK)	Active	EPA Top 17	Used to clean metals/ components prior to adhesive/ sealant applications	Acetone (ASTM-D329) or Methyl Isobutyl Ketone (MIBK) (ASTM D-1153)
5.	MIL-S-7126	Sealing Compound	Cancelled and superceded by AMS-S-7124		A polysulfide structural aircraft sealant	MIL-PRF-81733
6.	A-A-59281	Solvent cleaning compound for integral fuel tank	Active	MEK, Toluene	Wipe cleaning of aluminum surfaces and solvent resistant coating prior to chemical treatments or the application of integral fuel tank sealant	No suitable substitute exists at this time.
7.	PERMATEX Sealant 1372	Sealing Compound, Gasket, Hydrocarbon Fluid and Water Resistant	MIL-S-45180 Inactive	Isopropyl Alcohol	Threat and gasket sealing compounds that are resistant to fuels, engine oils, and water	Loctite Form-A-Gasket 1372
8.	RTV-162	Adhesive, sealant	Not found		Used to apply adhesive	- Does or may contain an ODS or EPA-17 chemical. - No suitable substitute exists at this time.
9.	MIL-S-29574	Compound, sealing	Active		Two component fuel resistant polythioether sealant — two types, three classes, fast curing at low and ambient temperatures	No suitable substitute exists at this time.



Sanding paint off of a piece of equipment is very tedious and labor intensive. Check the MatSub database for an alternative method/product that could be more cost effective and efficient.
U.S. Navy photo by Photographer's Mate 3rd Class Lamel J. Hinton.

Although the MatSub database contains many of the substitutes or “workarounds” that have been discovered during the course of countless manual reviews conducted across the NAVAIR community, making a material substitute without proper demonstration can have serious performance implications. Just because a substitute is listed in the MatSub database does not mean that the substitute is appropriate for use in every situation—substitutes are context-specific.

It is imperative that all of the potential impacts of a material substitute be fully understood before the decision to substitute is made to ensure there are no serious performance implications. Therefore, before any material substitute is made, a final verification must be performed to ensure that the substitute is appropriate.



While deployed, sailors perform a “42-day maintenance inspection and cleaning on an F/A-18E “Super Hornet”. Using improper substitute materials could have serious performance implications. MatSub database can determine if a product has been properly demonstrated and approved for use in that specific context.
U.S. Navy photo by Photographer's Mate 3rd Class Tyler Clements.



Small aircraft parts are primed in preparation for final painting in a waterfall spraying booth. Water provides a barrier to prevent paint from sticking and accumulating on the surface of the walls and floor, while helping to suppress harmful vapors and paint spray in the air. MatSub database identifies new alternative paints that have been tested and approved for use. U.S. Navy photo by Gary Rice.

The Benefits of the Material Substitution Database

The MatSub database has the following benefits:

- 1 It provides NAVAIR engineers, chemists, process specialists, and Environmental, Safety, and Occupational Health (ESOH) Coordinators with a tool to determine whether viable substitutes exist for particular materials and/or specifications.
- 2 It allows NAVAIR engineers and ESOH Coordinators to share knowledge gained in the environmental and material worlds and prevent duplication of effort.
- 3 It will help to communicate and standardize materials used throughout NAVAIR thereby promoting the most effective use of scarce resources.
- 4 It is a valuable reference source for ESOH Coordinators of new acquisition programs to explore possible alternatives, currently approved or in the works.

The Benefits of Using AIR 1.1E Product & Services

Through the effective planning, management, tracking, and monitoring of available resources, AIR 1.1E is institutionalizing sound ESOH management principles across NAVAIR. The benefits of this process include:

- a Reducing environmental risks and liabilities,
- b Achieving environmental benefits and cost savings,
- c Improving industrial processes,
- d Achieving program missions at a competitive advantage, and
- e Maintaining environmental compliance.

How to Acquire AIR 1.1E Products and Services

To acquire any of the products or services offered by AIR 1.1E, contact the AIR 1.1E representative listed on the back page at least 12-18 months prior to a scheduled milestone review. AIR 1.1E will provide a proposal and cost estimate for the products and services required and assign an ESOH Coordinator to the task.



MatSub database is a valuable tool in determining whether viable environmental benign substitutes exist for a particular material and/or specification. U.S. Navy photo by Photographer's Mate Airman Tommy Gilligan.



A beta, web-based version of the MatSub database is up and running and has already become a primary resource for the collection, assessment, and tracking of material uses, substitutions, and testing for NAVAIR Engineers and ESOH Coordinators.

Conclusion

In concert with NAVAIR's goals to continue to introduce best business practices, remove barriers to accomplishing the task at hand with greater efficiency, and improve NAVAIR's ability to make rapid decisions in support of emerging Fleet requirements, AIR 1.1E will continue to foster the awareness of its products and services that are available to help Program Managers incorporate sound environmental management into the acquisition lifecycle.

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The database is now available via the NAVAIR environmental information portal but given the sensitivity of the data contained in the MatSub database as well as the expertise required to interpret the results of database queries, access to the database is restricted. Please contact Cindy Webber for additional information.

For more information about AIR 1.1E products and services, visit the NAVAIR environmental website at www.enviro-navair.navy.mil or contact an AIR 1.1E representative.



www.enviro-navair.navy.mil

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